CENTRAL ELECTRICITY REGULATORY COMMISSION
NEW DELHI

Coram
1. Dr. Pramod Deo, Chairperson
2. Shri R. Krishnamoorthy, Member
3. Shri S.Jayaraman, Member
4. Shri V.S.Verma, Member

Petition No.284/2009 (Suo Motu)

IN THE MATTER OF

Determination of generic levellised generation tariff under Regulation 8 of the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009

ORDER

The Central Electricity Regulatory Commission (hereinafter referred to as "the Central Commission") has been vested with the following functions under clauses (a) and (b) of Section 79 of the Electricity Act, 2003 (hereinafter referred to as "the Act"):

(a) To regulate the tariff of the generating companies owned or controlled by the Central Government;

(b) To regulate the tariff of generating companies other than those owned or controlled by the Central Government, if such generating companies enter into or otherwise have a composite scheme for generation and sale of electricity in more than one State.

2. Section 61 of the Act empowers the Central Commission to specify, by regulations, the terms and conditions for the determination of tariff in accordance with the

provisions of the said section and the National Electricity Policy and Tariff Policy. Sub-section (h) of Section 61 of the Act stipulates that while determining tariff, the Commission shall be guided by the aspect of promotion of co-generation and generation from renewable sources of energy. Clause 6.4 of the Tariff Policy entrusts the responsibility on the Commission to frame guidelines for pricing of non-firm power especially from non-conventional sources when procurement is not through the competitive bidding process.

3. In exercise of the powers vested under Section 61 read with Section 178 of the Act and after previous publication, the Commission has notified the Central Electricity Regulatory Commission (Terms and Conditions for Tariff determination from Renewable Energy Sources) Regulations, 2009, (hereinafter referred to as "the RE Regulations"). The RE Regulations provide for terms and conditions and the procedure for determination of tariff of the following categories of renewable energy generating stations:

(a) Wind Power Project;

(b) Small Hydro Projects;

(c) Biomass Power Projects;

(d) Non-fossil fuel-based co-generation Plants;

(e) Solar Photo voltaic (PV) and Solar Thermal Power Projects.

4. The Renewable Energy (RE) Regulations require the Commission to determine the generic tariff on the basis of the *suo motu* petition, for the RE technologies for which norms have been provided in the regulations. Generic Tariff is different from the project specific tariff for which a project developer has to file petition before the commission as

per the format provided in the RE regulations. Pertinently, project specific tariff has been envisaged for the new RE technologies and the technologies which are still at the nascent stage of development, and the Commission shall determine the project specific tariff for such technologies on a case to case basis.

5. Clause (1) of Regulation 8 of the RE Regulations provides that "the Commission shall determine the generic tariff on the basis of suo *motu* petition at least six months in advance at the beginning of each year of the Control period for renewable energy technologies for which norms have been specified under the Regulations." As the first year of the control period has already commenced with the notification of the regulations with effect from 16.9.2009, the Commission in due discharge of the mandate under Regulation 8(1) of RE Regulations proceeds to determine the generic tariff of the RE projects for the first year of control period (i.e. FY 2009-10) through this order based on the financial principles and technology specific parameters.

USEFUL LIFE

6. Sub-clause (y) of clause(1) of Regulation 2 of the RE Regulations defines 'useful life' in relation to a unit of a generating station (including evacuation system) to mean the following duration from the date of commercial operation of such generation facility:

Renewable Energy projects	**Years**
Wind Energy	25
Small Hydro	35
Biomass	20
Non-fossil fuel co-generation	20
Solar PV	25
Solar Thermal	25

CONROL PERIOD

7. Regulation 5 of the RE Regulations provides that the control period for determination of tariff for renewable energy projects (RE projects) shall be of three years of which the first year is to be considered from the date of notification of these regulations till 31.3.2010. Proviso to the said regulation stipulates that the tariff determined for the RE projects commissioned during the control period shall continue to be applicable for the entire duration of the tariff period as specified in Regulation 6 of the RE Regulations. However, the benchmark cost for Solar PV and Solar thermal may be reviewed by the Commission annually.

TARIFF PERIOD

8. In terms of Regulation 6 of the RE Regulations, the tariff period in respect of the RE projects is as under:

Renewable Energy projects	**Years**
Wind Energy	13
Small Hydro (less than 5MW)	35
Small Hydro (between 5MW to 25 MW)	13
Biomass	13
Non-fossil fuel co-generation	13
Solar PV and Solar Thermal	25

In terms of clauses (4) and (5) of the said regulation, the tariff period specified above shall be reckoned from the date of commercial operation of the RE projects and the tariff determined under the regulations shall be applicable for the duration of the tariff period.

TARIFF STRUCTURE

9. Clause (1) of Regulation 9 of the RE Regulations stipulates that the tariff for RE projects shall be single part tariff consisting of the following fixed cost components:

(a) Return on equity;
(b) Interest on loan capital;
(c) Depreciation;
(d) Interest on working capital;
(e) Operation and maintenance expenses;

For renewable energy technologies having fuel cost component, like biomass power projects and non-fossil fuel based cogeneration, single part tariff with two components, fixed cost component and fuel cost component, is to be determined.

TARIFF DESIGN

10. In terms of Regulation 10 of the RE Regulations, the tariff design for renewable energy generating stations is as under**:**

"(1) The generic tariff shall be determined on levellised basis for the Tariff Period.

Provided that for renewable energy technologies having single part tariff with two components, tariff shall be determined on levellised basis considering the year of commissioning of the project for fixed cost component while the fuel cost component shall be specified on year of operation basis.

(2) For the purpose of levellised tariff computation, the discount factor equivalent to weighted average cost of capital shall be considered.

(3) Levellisation shall be carried out for the 'useful life' of the Renewable Energy while tariff shall be specified for the period equivalent to 'Tariff Period."

LEVELLISED TARIFF

11. Levellised Tariff is calculated by carrying out levellisation for 'useful life' of each technology considering the discount factor for time value of money.

Discount Factor:

The discount factor considered for this purpose is equal to the weighted average cost of the capital on the basis of normative debt: equity ratio (70:30) specified in the Regulations. Considering the normative debt equity ratio and weighted average of the rates for interest and equity component, the discount factor is calculated.

Interest Rate considered for the loan component (i.e. 70%) of Capital Cost is 14.29% (as explained later). For equity component (i.e. 30%) rate of Return on Equity (ROE) for the first ten (10) years is 19% and for 11th year onward till useful life of the RE project the rate is 24%. Based on these rates, the weighted average of rate of ROE has been calculated which is 22%. .

The discount factor derived by this method for each technology is as shown in the following table:

Details	Wind Energy	Small Hydro				Biomass	Non-fossil fuel co-generation	Solar PV	Solar Thermal
		Less than 5 MW (Himachal Pradesh, Uttarakhand and North Eastern States)	Between 5 MW to 25 MW (Himachal Pradesh, Uttarakhand and North Eastern States	Other States (below 5 MW	Other states (5 MW to 25 MW)				
Discount Rate (%)	16.60	16.8	16.8	16.8	16.8	16.45	16.45	16.60	16.60

CAPITAL COST

12. Regulation 12 of the RE Regulations stipulates that the norms for the capital cost as specified in the technology specific chapter shall be inclusive of all capital works like

plant and machinery, civil works, erection and commissioning, financing and interest during construction, and evacuation infrastructure up to inter-connection point. Technology specific capital cost of RE projects is discussed hereinunder:

(A) Capital Cost of Wind Energy

13. Wind Power projects located at the wind sites having minimum annual Wind Power Density(WPD) of 200 Watt/m2 measured at hub height of 50 meters and using new wind turbine generators are eligible for tariff determination under the RE Regulations. Regulation 24 provides that the capital cost for wind energy project shall include wind turbine generator including its auxiliaries, land cost, site development charges and other civil works, transportation charges, evacuation cost up to inter-connection point, financing charges and IDC. The normative capital cost of the wind energy projects shall be Rs.515 lakh/MW for the year 2009-10 being the first year of the control period and shall be subject to the adjustment over the control period on account of changes in the wholesale price index for steel and electrical machinery as per the indexation mechanism specified in Regulation 25 of the RE Regulations.

(B) Capital cost of Small Hydro Projects

14. Small Hydro Projects for the purpose of the RE Regulations cover those projects which are located at the sites approved by the State Nodal Agencies/State Governments using new plant and machinery and with installed power plant capacity lower than or equal to 25 MW. Regulation 28 of the RE Regulations specifies the following normative capital cost for small hydro projects during the first year of the control period i.e. FY 2009-2010:

Region	Project Size	Capital Cost (Rs in lakh/ MW)
Himachal Pradesh, Uttarakhand and North Eastern States	Below 5 MW 5 MW to 25 MW	700 630
Other States	Below 5 MW 5 MW to 25 MW	550 500

The capital cost for subsequent years of the control period shall be determined on the basis of indexation formula under Regulation 29 to cater for the changes in the wholesale price index for steel and electrical machinery.

(C) Capital Cost of Biomass based Power Projects

15. Biomass power project for the purpose of these regulations covers the projects using new plant and machinery based on Rankine cycle technology application using water cooled condenser, and biomass fuel sources where use of fossil fuel is limited to 15% of total fuel consumption on annual basis. Regulation 34 of RE Regulations provides that the normative capital cost for the biomass power projects based on Rankine cycle technology application using water cooled condenser shall be Rs.450 lakh/MW for the first year of the control period i.e. 2009-10 for tariff determination.

(D) Capital Cost of Non-fossil fuel based Cogeneration Projects

16. Non-fossil based cogeneration has been defined as the process in which more than one form of energy is produced in a sequential manner by using biomass. As per Regulation 4(4) of the RE Regulations, a project to qualify as the non-fossil based co-generation project must be using new plant and machinery with topping cycle mode of operation which uses the non-fossil fuel input for power generation and utilizes the

thermal energy generated for useful heat applications in other industrial activities simultaneously, and where the sum of useful power output and half of useful thermal output is greater than 45% of the plant's energy consumption during the season. The normative capital cost of the non-fossil based co-generation project shall be Rs.445 lakh/MW for 2009-10 i.e. the first year of the control period.

(E) Capital Cost of Solar PV Projects

17. Solar Photo Voltaic (PV) power projects which directly convert solar energy into electricity using the crystalline silicon or thin film technology or any other technology as approved by the Ministry of New and Renewable Energy and are connected to the grid qualify for the purpose of tariff determination under the RE Regulations. As per Regulation 57, the normative capital cost for Solar PV Power Project shall be Rs.1700 lakh/MW for the first year of the control period.

(F) Solar Thermal Power Project

18. In order to qualify for tariff determination under the RE Regulations, Solar Thermal Power Project shall be based on concentrated solar power technologies with line focusing or point focusing as may be approved by the Ministry of New and Renewable Energy and which uses direct sunlight to generate sufficient heat to operate a conventional power cycle to generate electricity. As per Regulation 61 of the RE Regulations, the normative capital cost for Solar Thermal Power Project shall be Rs.1300 lakh/MW for 2009-10.

19. The capital cost for the first year (2009-10) of the control period in respect of the renewable energy power generating stations is summarized as under:

(Rs in lakh/MW)

Renewable Energy Projects	Capital cost
(1) Wind Energy	515
(2) Small Hydro	
(a) Himachal Pradesh, Uttarakhand and North Eastern States (less than 5 MW)	700
(b) Himachal Pradesh, Uttarakhand and North Eastern States (5MW to 25 MW)	630
(c) Other States (below 5 MW)	550
(d) Other States (5MW to 25 MW)	500
(3) Biomass power projects	450
(4) Non-fossil fuel based co-generation projects	445
(5) Solar Photovoltaic power projects	1700
(6) Solar Thermal power projects	1300

DEBT-EQUITY RATIO

20. Clause (1) of Regulation 13 of the RE Regulations provides that the debt-equity ratio of 70:30 is to be considered for determination of generic tariff based on *suo motu* petition.

21. Based on the debt equity ratio of 70:30, the debt and equity components of the normative capital cost for determination of tariff for the RE projects have been worked out as under:

(Rs in lakh)

Renewable Energy Projects	Debt	Equity
(1) Wind Energy (for all zones)	360.5	154.5
(2) Small Hydro		
Himachal Pradesh, Uttarakhand and North Eastern States (below 5 MW)	490	210
Himachal Pradesh, Uttarakhand and North Eastern States (5 MW to 25 MW)	441	189
Other States (below 5 MW)	385	165
Other States (5MW to 25 MW)	350	150
(3) Biomass	315	135
(4) Non-fossil fuel co-generation	311.5	133.5
(5) Solar PV **(6) Solar Thermal**	1190 910	510 390

RETURN ON EQUITY

22. Clause (1) of Regulation 16 of the RE Regulations provides that the value base for the equity shall be 30% of the capital cost for generic tariff determination. Clause (2) of the said regulation stipulates the normative return on equity as under:

(a) Pre-tax 19% per annum for the first 10 years, and

(b) Pre-tax 24% per annum from the 11th year.

23. In accordance with the above regulations, return on equity has been worked out in respect of the RE generating technologies taking the value base of equity as 30% of the capital cost as under:

(Rs in lakh)

Details	Wind Energy	Small Hydro				Biomass	Non-fossil fuel co-generation	Solar PV	Solar Thermal
		Less than 5 MW (Himachal Pradesh, Uttarakhand and North Eastern States)	Between 5 MW to 25 MW (Himachal Pradesh, Uttarakhand and North Eastern States	Other States (below 5 MW	Other states (5 MW to 25 MW)				
Equity opening (Rs in lakh)	154.5	210	189	165	150	135	133.5	510	390
Return on Equity for the first 10 years (%)	19	19	19	19	19	19	19	19	19
Return on Equity after first 10 years (%)	24	24	24	24	24	24	24	24	24
Weighted average rate on ROE (%)	22	22.57	22.57	22.57	22.57	21.50	21.50	22	22

INTEREST ON LOAN

24. Clause (1) of Regulation 14 of the RE Regulations provides that the loan tenure of 10 years is to be considered for the purpose of determination of tariff for RE projects. Clause (2) of the said regulation provides for computation of the rate of interest on loan as under:

> "(a) *The loans arrived at in the manner indicated above shall be considered as gross normative loan for calculation for interest on loan. The normative loan outstanding as on April 1st of every year shall be worked out by deducting the cumulative repayment up to March 31st of previous year from the gross normative loan.*

(b) For the purpose of computation of tariff, the normative interest rate shall be considered as average long term prime lending rate (LTPLR) of State Bank of India (SBI) prevalent during the previous year plus 150 basis points.

(c) Notwithstanding any moratorium period availed by the generating company, the repayment of loan shall be considered from the first year of commercial operation of the project and shall be equal to the annual depreciation allowed."

25. In terms of the above, the computations of interest on loan for determination of tariff in respect of the RE projects treating the value base of loan as 70% of the capital cost and the weighted average of SBI prime lending rate for the financial year 2008-09 plus 150 basis points, are as under:

(Rs in lakh)

Details	Wind Energy	Small Hydro				Biomass	Non-fossil fuel co-generation	Solar PV	Solar Thermal
		Less than 5 MW (Himachal Pradesh, Uttarakhand and North Eastern States)	Between 5 MW to 25MW (Himachal Pradesh, Uttarakhand and North Eastern States	Other States (below 5 MW	Other states (5 MW to 25 MW)				
Gross loan opening (Rs in lakh)	360.5	490	441	385	350	315	311.5	1190	910
Period of repayment	10	10	10	10	10	10	10	10	10
Rate of interest (%)	14.29	14.29	14.29	14.29	14.29	14.29	14.29	14.29	14.29

DEPRECIATION

26. Regulation 15 of the RE Regulations provides for computation of depreciation in the following manner**:**

"(1) *The value base for the purpose of depreciation shall be the Capital Cost of the asset admitted by the Commission. The Salvage value of the asset shall be considered as 10% and depreciation shall be allowed up to maximum of 90% of the Capital Cost of the asset.*

(2) Depreciation per annum shall be based on 'Differential Depreciation Approach' over loan tenure and period beyond loan tenure over useful life computed on 'Straight Line Method'. The depreciation rate for the first 10 years of the Tariff Period shall be 7% per

annum and the remaining depreciation shall be spread over the remaining useful life of the project from 11th year onwards.

(3) Depreciation shall be chargeable from the first year of commercial operation.

Provided that in case of commercial operation of the asset for part of the year, depreciation shall be charged on pro rata basis."

27. In accordance with the above, the rate of depreciation for the first 10 years has been considered as 7% and the rate of depreciation from the 11th year onwards has been spread over the balance useful life of the RE project as under:

Details	Wind Energy	Small Hydro	Biomass	Non-fossil fuel co-generation	Solar PV	Solar Thermal
Useful Life (in years)	25	35	20	20	25	25
Rate of depreciation for 10 years (%)	7.00	7.00	7.00	7.00	7.00	7.00
Rate of depreciation after first 10 years (%)	1.33	0.80	2.00	2.00	1.33	1.33

INTEREST ON WORKING CAPITAL

28. Regulation 18 of the RE Regulations provides for the working capital requirements of the RE projects as under:

"(1) The Working Capital requirement in respect of wind energy projects, small hydro power, solar PV and Solar thermal power projects shall be computed in accordance with the following :

Wind Energy / Small Hydro Power /Solar PV / Solar thermal

(a) Operation & Maintenance expenses for one month;

(b) Receivables equivalent to 2 (Two) months of energy charges for sale of electricity calculated on the normative CUF;

(c) Maintenance @ 15% of operation and maintenance expenses

(2) The Working Capital requirement in respect of biomass power projects and non-fossil fuel based co-generation projects shall be computed in accordance with the following clause:

Biomass Power and Non-fossil fuel Co-generation

(a) Fuel costs for four months equivalent to normative PLF;

(b) Operation & Maintenance expense for one month;

(c) Receivables equivalent to 2 (Two) months of fixed and variable charges for sale of electricity calculated on the target PLF;

(d) Maintenance spare @ 15% of operation and maintenance expenses

(3) Interest on Working Capital shall be at interest rate equivalent to average State Bank of India short term PLR during the previous year plus 100 basis points"

29. Receivables equivalent to two months of actual fixed cost have been considered. The interest on working capital has been worked out as specified below for determination of tariff of the RE projects:

(Rs in lakh)

Details	Wind Energy	Small Hydro	Biomass	Non-fossil fuel co-generation	Solar PV	Solar Thermal
(A) For Fixed charges						
(i) O&M expenses (month)	1	1	1	1	1	1
(ii) Maintenance spares (%) of O&M expenses	15	15	15	15	15	15
(iii) Receivables (months)	2	2	2	2	2	2
(B) For Variable Charges						
Biomass/Bagasse stock (months)	-	-	4	4	-	-
(C) Rate of Interest on working capital (%)	13.79	13.79	13.79	13.79	13.79	13.79

OPERATION AND MAINTENANCE EXPENSES

30. Regulation 18 of the RE Regulations provides for Operation and Maintenance Expenses (O&M expenses) in respect of RE projects as under**:**

"Operation and Maintenance Expenses

(1) Operation and Maintenance or O&M expenses' shall comprise repair and maintenance (R&M), establishment including employee expenses, and administrative and general expenses.

(2) Operation and maintenance expenses shall be determined for the Tariff Period based on normative O&M expenses specified by the Commission subsequently in these Regulations for the first Year of Control Period.

(3) Normative O&M expenses allowed during first year of the Control Period (i.e.FY 2009-10) under these Regulations shall be escalated at the rate of 5.72% per annum over the Tariff Period."

31. The normative O&M expenses for various RE technologies specified under the relevant provisions of the RE Regulations are as under:

(a) Wind Energy: Regulation 27 of RE Regulations provides that the normative O&M expenses for the first year of the control period (i.e. 2009-10) is Rs 6.50 lakh per MW and shall be escalated at the rate of 5.72% per annum over the tariff period for determination of the levellised tariff.

(b) Small Hydro: Regulation 32 of RE Regulations provides that the normative O& M expenses for small hydro projects for the year 2009-10 shall be as given in the table below and shall be escalated at the rate of 5.72% per annum over the tariff period for determination of the levellised tariff:

Region	Project Size	O&M expenses (Rs in lakh/MW)
Himachal Pradesh, Uttarakhand and North Eastern States	Below 5 MW 5 MW to 25 MW	21 15
Other States	Below 5 MW 5 MW to 25 MW	17 12

(c) Biomass: Regulation 39 of RE Regulations provides that the normative O& M expenses for biomass based projects for the year 2009-10 shall be Rs 20.25 lakh/MW and shall be escalated at the rate of 5.72% per annum over the tariff period for determination of the levellised tariff.

(d) Non-fossil fuel co-generation: As per Regulation 55 of RE Regulations, the normative O&M Expenses for non-fossil fuel co-generation projects for the year 2009-10 is Rs 13.35 lakh per MW which shall be escalated at the rate of 5.72% per annum over the tariff period for determination of the levellised tariff.

(e) Solar PV: In terms of Regulation 59 of RE Regulations, the normative O&M expenses for solar PV projects for the year 2009-10 is Rs 9.00 lakh/MW which shall be escalated at the rate of 5.72% per annum over the tariff period for determination of the levellised tariff.

(f) Solar Thermal: Regulation 63 specifies the normative O&M expenses for solar thermal power projects during the first year of operation as Rs 13.0 lakh/MW which shall be escalated at the rate of 5.72% per annum over the tariff period for determination of the levellised tariff.

32. The normative O&M expenses have been worked out as specified above for determination of tariff for the renewable energy generating stations.

CAPACITY UTILISATION FACTOR

33. Regulations 26, 30, 58 and 62 of the RE Regulations specify the norms for Capacity Utilization Factor (CUF) in respect of the renewable energy generating stations

except biomass and non- fossil fuel based cogeneration as per the details given in the table below which has been considered for determination of tariff.

Renewable Energy Projects	CUF
(A) Wind Energy Annual Mean Wind Power Density (W/m2) Wind zone-1 (200-250) Wind zone-2 (250-300) Wind zone-3 (300-400) Wind zone-4 (above 400)	 20% 23% 27% 30%
(B) Small Hydro (i) Himachal Pradesh, Uttarakhand and North Eastern States (ii) Other States	 45% 30%
(C) Solar PV	19%
(D) Solar Thermal	23%

34. In terms of clause (2) of Regulation 26 of the RE Regulations, the annual mean wind power density specified above is to be measured at 50 meter hub-height and as per clause (3), for the purpose of classification of wind energy project into particular wind zone class, the State-wise wind power density map prepared by Centre for Wind Energy Technology (C-WET) annexed as schedule to the said regulations, is to be considered.

PLANT LOAD FACTOR (PLF)

35. Regulation 36 of the RE Regulations specifies the plant load factor for biomass based renewable energy generating stations as given in the table below which has been considered for determination of fixed charges component of tariff.

Renewable Energy Projects	PLF (%)
Biomass (a) During stabilization (6 months) (b) During first year after stabilization (c) Second year onwards	 60% 70% 80%

36. Regulation 49 of the RE Regulations stipulates the plant load factor for non-fossil fuel based co-generation projects as under, computed on the basis of plant availability for number of operating days considering the operations during crushing season and off-season and load factor of 92%. The number of operating days for different States as specified in the regulations is as under:

States	Operating days	PLF (%)
Uttar Pradesh and Andhra Pradesh	120 days (crushing)+ 60 days (off-season) = 180 days	45%
Tamil Nadu and Maharashtra	180 days (crushing)+ 60 days (off-season) = 240 days	60%
Other States	150 days (crushing) + 60 days (off-season) = 210 days	53%

AUXILIARY POWER CONSUMPTION

37. Regulations 31, 37, 50 and 64 of the RE Regulations stipulate the auxiliary power consumption factor as under which has been considered for determination of tariff of the RE projects :

Renewable Energy Projects	Auxiliary Consumption factor
Small Hydro	1.0%
Biomass	10.0%
Non-fossil fuel co-generation	8.5%
Solar Thermal	10.0%

STATION HEAT RATE

38. The Station Heat Rates (SHR) specified under Regulations 38 and 51 of the RE Regulations for biomass and non-fossil fuel based co-generation projects are as under:

Renewable Energy Projects	SHR (kCal / kWh)
Biomass	3800
Non-fossil fuel co-generation (for power component)	3600

FUEL

(a) Fuel Mix

39**.** Clause (1) of Regulation 40 of the RE Regulations stipulates that the biomass based power generating stations are to be designed in a way that it uses different types of non-fossil fuels available within the vicinity of biomass power project such as crop residues, agro-industrial residues, forest residues etc. and other biomass fuels as may be approved by the Ministry of Non-Renewable Energy (MNRE). Clause (2) of the said regulations stipulates that the biomass power generating companies are to ensure fuel management plan to ensure adequate availability of fuel to meet the respective project requirements.

(**b) Use of fossil fuel**

40. In terms of Regulation 41 of the RE Regulations, the use of fossil fuel is to be limited to the extent of 15% of total fuel consumption on annual basis and in terms of Regulation 42 of the said regulations the mechanism for monitoring the use of fossil fuel is as under:

> *"(1) The Project developer shall furnish a monthly fuel usage statement and monthly fuel procurement statement duly certified by Chartered Accountant to the beneficiary (with a copy to appropriate agency appointed by the Commission for the purpose of monitoring the fossil and non-fossil fuel consumption) for each month, along with the monthly energy bill. The statement shall cover details such as;*

(a) Quantity of fuel (in tonnes) for each fuel type (biomass fuels and fossil fuels) consumed and procured during the month for power generation purposes;

(b) Cumulative quantity (in tonnes) of each fuel type consumed and procured till the end of that month during the year;

(c) Actual (gross and net) energy generation (denominated in units) during the month;

(d) Cumulative actual (gross and net) energy generation (denominated in units) until the end of that month during the year;

(e) Opening fuel stock quantity (in tonnes);

(f) Receipt of fuel quantity (in tonnes) at the power plant site; and

(g) Closing fuel stock quantity (in tonnes) for each fuel type (biomass fuels and fossil fuels) available at the power plant site.

(2) Non-compliance with the condition of fossil fuel usage by the project developer, during any financial year, shall result in withdrawal of applicability of tariff as per these Regulations for such biomass based power project."

(c) **Calorific value**

41. In terms of Regulation 43 of the RE Regulations the calorific value of biomass fuel for determination of tariff is as under:

State	Calorific value(kCal/kg)
Andhra Pradesh	3275
Haryana	3458
Maharashtra	3611
Madhya Pradesh	3612
Punjab	3368
Rajasthan	3689
Tamilnadu	3300
Uttar Pradesh	3371
Other States	3467

42. In terms of Regulation 52 of the said regulations, the gross calorific value for bagasse to be considered in case of non-fossil fuel co-generation projects is 2250

kCal/kg and for the use of biomass fuels other than bagasse, the calorific value as specified above shall be applicable.

(d) Fuel cost

43. In terms of Regulation 44 of the RE Regulations, the biomass fuel price during the period 2009-10 shall be as indicated in the table below:

State	Biomass price (Rs/MT)
Andhra Pradesh	1301
Haryana	2168
Maharashtra	1801
Madhya Pradesh	1299
Punjab	2092
Rajasthan	1822
Tamilnadu	1823
Uttar Pradesh	1518
Other States	1797

44. In terms of Regulation 53 of the RE Regulations, the price of bagasse (for non-fossil fuel based co-generation projects) during the period 2009-10 shall be as indicated in the table below:

State	Bagasse price (Rs/MT)
Andhra Pradesh	899
Haryana	1411
Maharashtra	1123
Madhya Pradesh	809
Punjab	1398
Tamilnadu	1243
Uttar Pradesh	1013
Other States	1163

Subsidy or incentive by the Central / State Government

45. Regulation 22 of the RE Regulations provides as under:

> *"The Commission shall take into consideration any incentive or subsidy offered by the Central or State Government, including accelerated depreciation benefit if availed by the generating company, for the renewable energy power plants while determining the tariff under these Regulations.*
>
> *Provided that the following principles shall be considered for ascertaining income tax benefit on account of accelerated depreciation, if availed, for the purpose of tariff determination:*
>
> > *i. Assessment of benefit shall be based on normative capital cost, accelerated depreciation rate as per relevant provisions under Income Tax Act and corporate income tax rate.*
> >
> > *ii. Capitalisation of RE projects during second half of the fiscal year. Per unit benefit shall be derived on levellised basis at discount factor equivalent to weighted average cost of capital."*

46. In terms of the above regulation, for the projects availing the benefit of Section 80 IA of the Income Tax Act, 1961, the Minimum Alternate Tax (MAT) @ 16.995% (15% MAT+10% surcharge+3% education cess) for the first ten years and thereafter the normal tax rate @ 33.99% (30% IT rate+ 10% surcharge +3% Education cess) has been considered. For the purpose of determining net depreciation benefits, depreciation @ 5.28% as per straight line method (Book depreciation as per Companies Act, 1956) has been compared with depreciation as per Income Tax rate i.e. 80% of the written down value method and depreciation for the first year has been calculated at the rate of 50% of 80% i.e 40%, as project is capitalized during the second half of the financial year as per proviso (ii) to Regulation 22. Tax benefit has been worked out as per MAT/normal tax rate on the net depreciation benefit. Per unit levellised accelerated depreciation benefit has been computed considering the weighted average cost of capital as discount factor.

47. In the light of the discussion made in the preceding paragraphs, the generic tariffs of the following RE projects for the financial year 2009-10 have been determined as under:

RE technologies as per CERC RE Tariff Regulations Norms for FY 2009-10

	Levellised Fixed	Levellised Variable	Levellised total tariff	Benefit of Accelerated Depreciation, if availed	Net Levellised Tariff upon adjusting for accelerated Depreciation benefit, (if availed)
	(Rs / kWh)	(Rs / kWh)	(Rs / kWh)	(Rs/kWh)	(Rs/kWh)
Wind Energy					
Wind Zone -1 (CUF 20%)			5.63	(0.37)	5.26
Wind Zone -2 (CUF 23%)			4.90	(0.32)	4.58
Wind Zone -3 (CUF 27%)			4.17	(0.28)	3.89
Wind Zone -4 (CUF 30%)			3.75	(0.25)	3.5
Small Hydro Power Project					
HP, Uttarakhand and NE States (Below 5MW)			3.90	(0.23)	3.67
HP, Uttarakhand and NE States (5MW to 25 MW)			3.35	(0.21)	3.14
Other States (Below 5 MW)			4.62	(0.27)	4.35
Other States (5 MW to 25 MW)			4.00	(0.25)	3.75
Solar Power Projects					
Solar PV			18.44	(1.30)	17.14
Solar Thermal			13.45	(0.91)	12.54

Biomass Power Project					
Andhra Pradesh	1.94	2.21	4.15	(0.10)	4.05
Haryana	2.03	3.49	5.52	(0.10)	5.42
Madhya Pradesh	1.93	2	3.93	(0.10)	3.83
Maharashtra	1.98	2.78	4.76	(0.10)	4.66
Punjab	2.03	3.46	5.49	(0.10)	5.39
Rajasthan	1.98	2.75	4.73	(0.10)	4.63
Tamil Nadu	2.01	3.07	5.08	(0.10)	4.98
Uttar Pradesh	1.96	2.51	4.47	(0.10)	4.37
Others	2.00	2.88	4.88	(0.10)	4.78
Non-fossil fuel based cogeneration					
Andhra Pradesh	2.86	2.07	4.93	(0.15)	4.78
Haryana	2.53	3.25	5.78	(0.13)	5.65
Maharashtra	2.21	2.59	4.80	(0.12)	4.68
Madhya Pradesh	2.43	1.86	4.29	(0.13)	4.16
Punjab	2.53	3.22	5.75	(0.13)	5.62
Tamil Nadu	2.24	2.86	5.10	(0.12)	4.98
Uttar Pradesh	2.88	2.33	5.21	(0.15)	5.06
Others	2.49	2.68	5.17	(0.13)	5.04

48. The detailed calculations of the generic tariff are annexed to this order as per the details given hereunder:

(a) Wind power projects:

(i) Wind Zone-I — Annexure 1A
(ii) Wind Zone-II — Annexure 1B
(iii) Wind Zone-III — Annexure 1C
(iv) Wind Zone-IV — Annexure 1D

(b) Small hydro projects:

(I) Projects Less than 5 MW for HP, Utarakhand and NE States — Annexure 2A
(II) Projects between 5 MW and 25 MW for HP, Utarakhand And NE States — Annexure 2B
(III) Projects less than 5 MW for other States — Annexure 2C

(IV)	Projects between 5 MW and 25 MW for other States	Annexure 2D

(c) Bio-mass power project:

(I)	Andhra Pradesh	Annexure 3A
(II)	Haryana	Annexure 3B
(III)	Maharashtra	Annexure 3C
(IV)	Punjab	Annexure 3D
(V)	Madhya Pradesh	Annexure 3E
(VI)	Rajasthan	Annexure 3F
(VII)	Uttar Pradesh	Annexure 3G
(VIII)	TamilNadu	Annexure 3H
(IX)	Other States	Annexure 3I

(d) Co-generation projects:

(I)	Andhra Pradesh	Annexure 4A
(II)	Haryana	Annexure 4B
(III)	Maharashtra	Annexure 4C
(IV)	Madhya Pradesh	Annexure 4D
(V)	Punjab	Annexure 4E
(VI)	Uttar Pradesh	Annexure 4F
(VII)	TamilNadu	Annexure 4G
(VIII)	Other States	Annexure 4H

(e) Solar projects:

(I)	Solar PV projects	Annexure 5A
(II)	Solar thermal projects	Annexure 5B

49. The above generic tariff is for the RE power projects commissioned during the FY 2009-10 and fulfilling the conditions of the RE regulations.

-sd/-	-sd/-	-sd/-	-sd/-
[V.S.VERMA]	**[S. JAYARAMAN]**	**[R. KRISHNAMOORTHY]**	**[Dr. PRAMOD DEO]**
MEMBER	**MEMBER**	**MEMBER**	**CHAIRPERSON**

New Delhi dated the 3rd December, 2009